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ABSTRACT

Cost analysis is not solely the concern of the technically proficient analyst. Determining what uses are appropriate for cost information is a broad policy issue in which academic administrators, department chairmen, and faculty have a tangible interest and should have at least a conceptual grasp of this subject. It is particularly important to appreciate what the technical experts can accomplish with cost analysis and what the problems are. Placing cost analysis in its appropriate context has needed to be done for some time. It involves the examination of these concerns: (1) the recent increase on pressures for cost analysis and the motivations behind these pressures; (2) the guidelines for cost analysis that have been established at NCHEMS; (3) the directions that the development of cost analysis procedures should take in the future. Appropriately or not, the growth of cost analysis in postsecondary education over the past decade has taken place largely in the context of accountability, and more recently in an environment of resource acquisition frustrations. Cost information is increasingly important in planning, budgeting, budget control, and evaluation of performance. (Author)

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Cost Analysis in Postsecondary Education:

The Contextual Realities

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National Center for Higher Education Management Systems at WICHE

by Ben Lawrence

Cost analysis in postsecondary education embraces a two-fold controversy. There is much disagreement about what techniques should be used. And there is a somewhat more emotionally charged debate about the proper uses of the information produced by cost analysis. Controversy tends to narrow the focus of our attention, of course, and we would do well to keep in mind that costing is but one of the management problems facing postsecondary education. Certainly it is not the only problem being addressed at NCHEMS—though it is as tough a problem as any the Center has encountered.

Though complex and technical and requiring considerable expertise, cost analysis is not solely the concern of the technically proficient analyst. Determining what uses are appropriate for cost information is a broad policy issue in which academic administrators, department chairmen, and faculty have a tangible interest. Therefore they should have at least a conceptual grasp of this abstruse subject. It is particularly important that they be able to view cost analysis in a realistic, pragmatic light—that they appreciate what the technical experts can accomplish with cost analysis and what the problems are.

Placing cost analysis in its appropriate context has needed to be done for some time. It involves the examination of these concerns:

- The recent increase in pressures for cost analysis and the motivations behind these pressures.
- The guidelines for cost analysis that have been established at NCHEMS.
- The directions that the development of cost analysis procedures should take in the future.

With respect to recent pressures and motivations, we must first recognize that appropriately or not, the growth of cost analysis in postsecondary education over the past decade has taken place largely in the context of accountability, and more recently in an environment of resource acquisition frustrations. Today we find almost every institution of any size and almost every state undertaking some form of cost analysis. Cost information is increasingly important in planning, budgeting, budget control, and evaluation of performance.

There is a good deal of sincerely motivated and sensible opposition to the unbridled use of so-called cost effectiveness as the primary measure of the value of educational programs and services. But more and more often, it is the yardstick most heavily relied on by both public and private funders.

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COOPERATION: *Developing Procedures Efficiently*

The states as well as the institutions have discovered that costing procedures are expensive to develop and difficult to implement. This general experience of difficulty caused a number of institutions and states in the West to decide in 1968 to mount a cooperative, three-year effort to develop common costing procedures. The intent was to develop procedures that would permit the voluntary exchange of cost information among Western institutions. The cooperative program was housed in the Western Interstate Commission for Higher Education (WICHE). Ultimately this program grew at WICHE into the National Center for Higher Education Management Systems (NCHEMS).

Since its inception, then, NCHEMS has been engaged in costing work and therefore has been embroiled in controversies. The Center has sought to respond in a positive way to the concerns that generate these controversies, developing procedures and products that, taken together, help users to see costing from a proper perspective and help to allay some of the fears about possible misuses of costing information.

But before the procedures and products developed at NCHEMS are reviewed, costing should be defined and the different concepts of costing that have come into use in postsecondary education should be distinguished. Costing, or cost accounting, is the business of determining the cost of units of service. Financial accounting, by contrast, keeps track of expenditures made by an organizational unit or expenses incurred in performing a given function. Costing involves the collection and classification of different kinds of expenditures—salaries and benefits, supplies and services, facilities—during a particular period of time and the allocation of these expenditures to specific units of service produced during the period in question.

DOMINANT COSTING CONCERNS: *Programs, Units, Comparability*

The pressures for cost data in postsecondary education have concentrated primarily in three areas. The first is *program costing*. Traditionally in educational institutions, most cost analysis has focused on resource cost—the cost of salaries, fuel, buildings, supplies, and such. There is more demand today to know program cost because obviously there is more need to make sound judgments about the educational worth of the program relative to its costs. In the prevailing tight-money environment, the very survival of a program may depend on the ratio of its benefits to its costs.

The second approach to gain favor in recent years is *unit costing*. Unit cost information permits projection of costs at various levels of operation, development of formulas for allocating dollars, and cost comparisons. The traditional resource cost approach will determine an institution's total salary costs. But that information does not help calculate salary costs at various staffing levels. The average salary, or unit cost, of faculty is required for that. And knowing the total cost of a particular program does not facilitate the projection of the cost of that program at various levels of operation. Again, some unit costs associated with that program are required.

In assessing unit costing, three limitations should be kept in mind:

- In recent years, the calculation of programs costs has focused entirely on the instructional function, since those who pay the bills generally view instruction as the prime purpose of education beyond the high school.
- By and large, funders regard the student degree or program-completion certificate as the principal benefit derived from the instructional program. The result has been that efforts to determine unit costs of instructional programs have concentrated almost exclusively on cost per student—which, with some adjustment for noncompleters, equates to cost per degree or certificate.
- Average or unit cost per student is at best a crude indicator for projecting costs of operating a program at various levels. It is less than satisfactory because when unit costs are used to project costs of programs at different levels of operation, at least three important considerations are ignored: the economics of scale, the costs of developing new programs or phasing out old ones, and the marginal costs incurred in adding or dropping students within a given program.

The third and most popular concept is *comparable cost*. This term must be understood to denote comparisons that have real significance to a particular decision. Comparing the unit cost of fuel oil to the unit cost of coal is of little use in determining which would be more economical. To know that, we need to know the cost per B.T.U. of the heat produced by each fuel. The trouble is that in postsecondary education, we do not have an output unit of measure equivalent to the B.T.U. We cannot so neatly and reassuringly quantify the benefits, or outputs, or outcomes, or consequences, of education: indeed, we cannot even settle on one general term for them.

Cost analysis which utilizes all three concepts—program costing, unit costing, and comparable cost—will tell us the comparable cost per student by program. NCHEMS, with substantial assistance from a good number of institutions and states, has been trying to use all three concepts. And the Center has had more problems than it bargained for.

COMPARABLE COST: *Tough Nut to Crack*

The most difficult aspect of this work involves the concept of comparable cost. The NCHEMS approach to this question argues that before meaningful comparisons can be made, at least three conditions have to be met:

- The information—the numbers and the taxonomic labels—used in the comparison must be *compatible*. That is, the information must be produced by standard procedures.
- In making comparisons, factors other than cost and labels must be considered—factors that describe in deail what it is that is being costed. We do not want to fall into the trap of assuming that apples and oranges taste alike because both have been designated as edible fruit.
- The final determinant of whether a comparison is appropriate or not is *the decision* to which the comparison is addressed. And here many philosophical differences are bound to arise regarding what is appropriate. They are best resolved by carefully examining the nature of the decision that must be made. In this regard, it is well to remember that a comparison may function to discover contrasts as well as similarities. Sometimes we wish to make comparisons that show differences, because we do not want to waste funds on duplications. In other instances, we may want to know whether two things are essentially similar—whether a less costly alternative can be adopted without loss of quality or function. At other times, we may make comparisons to know where to buy: we know exactly what we want, and therefore need only to compare prices.

A great many individuals and institutions have assisted the cost analysis effort at NCHEMS with advice, dollars, staff resources, and participation in step-by-step testing along the way. An impressive array of products is now available and being used at a large number of institutions. Nonetheless, the Center is quite realistic about how limited the progress has been. NCHEMS is all too aware of the many misinterpretations and innocent misuses of costing information. It is equally aware of the need to develop new kinds of costing data. The more we get done, the more sharply we sense how much remains to be done. To understand why, it will be necessary to retrace some of the steps in costing that NCHEMS has taken over the past seven years.

We may begin with a typical problem in program costing. To estimate cost per student in a history degree program, the analyst has to deal with the fact that history majors are also taking courses in the English department, the math department, and perhaps a dozen other departments. It is an obviously complicated task to develop some convenient method for attributing to the history degree program all the costs incurred by other departments in providing instruction to history majors. To make such estimates, an institution must have developed sophisticated record-keeping systems for both students and courses. In addition, it must have a calculating mechanism.

A PRIMARY CONCEPT: *The ICLM*

To meet this need, NCHEMS built into its costing method a concept which has come to be known as the *Induced Course Load Matrix*—the ICLM. The matrix estimates the credit hour work load that an average student enrolled in a particular program induces on each department of the institution. This concept provides a workable, though certainly not ideal, solution to one of the major problems of determining cost per student major. The ICLM also can determine the average unit cost of student degree programs. Dividing the degree program costs through by an average credit hour load provides a cost-per-student statistic. But having arrived at these instructional unit costs, an institution still confronts a number of serious problems.

If, for instance, costs per student major are to be compared among institutions, some way is required to equate the degree programs in which students major. This led NCHEMS to develop a taxonomy of subject matter areas, or programs. Eventually the U.S. Office of Education adopted the NCHEMS taxonomy for reporting purposes in higher education. The taxonomy has several shortcomings, however, because tradeoffs had to be made between comprehensiveness and practical working utility. While the current taxonomy contains nearly 300 categories, users occasionally still have difficulty in determining the proper categories for some of their programs. In addition, some categories are still very broadly defined. The taxonomy does, however, provide a convenient if rudimentary mechanism for reporting about discipline programs. And its development has led to further efforts to overcome the difficulties of program costing.

Instructional costing was given top priority by the institutions and agencies that were supporting and working with NCHEMS. But they were not long in directing the Center to expand its costing approach to embrace all institutional activities. Accordingly, The NCHEMS Program Classification Structure was developed to categorize all of the programs and activities of institutions of higher education. The HEGIS Taxonomy of Instructional Programs was built into the PCS to accommodate the instructional mission of institutions. But research and public service programs—libraries, museums, security, administration, and so on—also had to be included.

It took two and a half years of study and consensus making to develop the NCHEMS Program Classification Structure. It is revised from time to time to accommodate new developments and to correct problems discovered in operational use. While imperfect and incomplete, the PCS is a usefully comprehensive, management-oriented structure to which costs and a good many other important pieces of information can be attached.

The fact that both the HEGIS taxonomy and the Program Classification Structure defined programs only in crude terms made it probable that cost comparisons utilizing them would be misleading. The history programs of two institutions are not necessarily the same in every significant respect just because they have the same name and fall into the same PCS category. Before the costs of these two programs can be

compared meaningfully, their differences must be identified.

NCHEMS therefore developed the concept of Program Measures. With such measures, describing program objectives, intended target and beneficiary groups, expected activity levels, estimated resource utilization, and expected outcomes, the extent of differences among programs lumped in the same PCS category can be determined. If the differences are substantial, perhaps cost comparison should not be made at all. If the differences are only slight, they can be taken into consideration judgmentally when cost comparisons are made.

THE ELUSIVE GOAL: *Measuring Outcomes*

Let's return now to how valuable it would be to have in education a unit of measure such as the B.T.U. Grades and kinds of coal can be differentiated in terms of a number of characteristics. But for cost comparison purposes, the true test of a given sort of coal is the amount of heat, the number of B.T.U.'s, it yields per ton. So if the price is the same per ton, hard anthracite coal is better than soft bituminous coal. In the same way, the true test of a program in postsecondary education is the benefit or value that it adds to the student and to society.

Over the past five years, NCHEMS has spent nearly $500,000 trying to devise methods for quantitatively describing, however crudely, the benefits or outcomes of postsecondary education. Some of the Center's more promising research ideas are just now being put into practical use. But much more research is needed. Measuring the outcomes of postsecondary education is still in a primitive state. Probably we will not be able to measure these benefits satisfactorily for many years, if ever. But so long as the possibility remains, the effort ought to be made. The ability to quantify *some* outcomes of postsecondary education, however few, will have positive accountability value. Such information can be used without diverting attention from or slighting the host of subjective outcomes that must be preserved and fostered.

In any case, NCHEMS has diligently tried to find ways to measure the outcomes of postsecondary education, and the effort is not slackening. A problem encountered early was the necessity to distinguish between intermediate and final outcomes. Again, consider a simple case in point. Every institution operates a library, which has specific and often significant impacts on most of the other educational activities of the institution. Obviously, if libraries did not contribute to the outcomes of postsecondary education, they would not be funded. But mainly they produce intermediate outcomes: their contributions to primary programs of instruction, research, and public service are indirect.

It is easy enough to total up the costs of library services. But when NCHEMS began work on measuring outcomes, there was no established way of allocating those costs, and the costs of other support programs of the institution, to the primary programs that produce final outcomes. Such allocation procedures would make it possible to compute not only the direct costs but also the full costs of instruction, research, and public service.

PUTTING THE PUZZLE TOGETHER: *Cost Finding Principles*

These challenges led NCHEMS to a large research effort, referred to as Cost Finding Principles. This project undertook to empirically examine hundreds of different ways of assigning support costs to the various primary programs. A set of allocation procedures was designed to be consistent with all of the other pieces of the costing puzzle that the Center had developed, and to be suitable for wide use. Admittedly, most institutions find these allocation procedures, as well as the other costing procedures, far from easy to implement. They require that an institution's accounting system meet rigid standards—standards that many institutions have not yet been able to meet to their satisfaction.

NCHEMS therefore cosponsored the *Joint Accounting Group*—a cooperative effort by the National Association of College and University Business Officers, the American Institute of Certified Public Accountants, and the Center to develop new accounting guidelines and procedures. The Joint Accounting Group reached consensus on uniform definitions of accounting terms and standardized categories for the classification of transactional financial data. As colleges and universities adopt and implement this group's recommendations, it will also be easier for these institutions to use the costing procedures and products developed at NCHEMS.

Having developed an interlocking series of products and procedures to determine and display institutional costs, NCHEMS next looked at factors that could substantially affect institutional costs. Of the Center's many efforts in this respect, three may be taken as representative examples.

The first is called the *Higher Education Finance Manual.* One of the many products developed in conjunction with this project was the so-called source/use matrix. In oversimplified terms, this matrix allows an examination of the tradeoffs that may be possible under given restrictions. For example, differing restrictions on use, many of them severe, often are attached to the various kinds of funds which come to a particular institution. If these restrictions are not kept in mind, a misleading interpretation of uses of funds can be made, with resulting distortions in costing information.

A FLUCTUATING COST FACTOR: *Student Choice*

The second factor that can substantially affect costs is student choice. To provide a wide range of program choices to students, individual institutions must surrender some control over program costs. If students swing unpredictably towards a particular program, the costs of both that and other programs will be affected. To calculate the impact that shifts in student choices and changing student enrollment can have on program costs, NCHEMS developed the

Student Flow Model and the Resource Requirements Prediction Model.

A third institutional costing factor is faculty. Quite properly, the faculty represents the single biggest cost item in the typical institutional budget. Therefore it is especially important to equitably distribute faculty costs among the various programs. This distribution is of major concern in complex institutions where faculty are expected to engage in diverse yet jointly productive activities. The Center's Faculty Activity Analysis project has developed workable procedures to help institutions distribute their faculty costs.

After five years of research, pilot testing, and achieving consensus among potential users of its products, NCHEMS made a preliminary effort at information exchange among institutions. A number of practical implementation problems soon developed. Previous pilot-test activities had uncovered a plentitude of problems. But since NCHEMS staff had been working with a small group of institutions, these problems could be overcome on an individual basis.

Now, however, solutions had to be found that would be workable in a large number of institutions. Computer software had to be developed that would be suitable for different types of computers and different operational data systems. Manuals had to be written in sufficient detail to enable any institution to follow the prescribed procedures. People had to be trained. By comparison with its previous activities, the Center found these undertakings immense. For example, 1,000 persons took part in just one series of training seminars in the spring of 1975.

The NCHEMS Information Exchange Procedures (IEP) have been modified as a result of earlier pilot tests and new approaches to on-campus implementation problems have been developed. Widescale implementation of IEP is under way.

VALUABLE CAVEATS: *Cost Analysis Guidelines*

In spite of the Center's best care and effort to develop cost analysis procedures and products of high quality, they have distinct limitations. If they are used improperly, the numbers produced will be misleading. Accordingly, NCHEMS has formulated guidelines for the use of its cost analysis procedures. Here are some of them:

- These procedures produce estimates of costs incurred by the institution. But they tell us nothing about the costs incurred by students while attending school, such as room and board, tuition, fees, books, and foregone income.
- These detailed programmatic costs are intended primarily for internal management use. Much of the information generated by the cost analysis procedures is too detailed and too disaggregated for use by decision makers outside the institution.
- Before cost comparisons are made, three conditions must be satisfied: 1) The information to be compared must be compatible—that is, produced by the same procedures. 2) The programs to be compared must be categorically alike and their specific similarities and differences must be adequately described by program measure information. 3) The decision to be made as a result of the comparison must be clearly identified.
- NCHEMS cost analysis procedures do not ignore the problems of complex institutions, and indeed some complex institutions have used them. But the procedures are at present heavily focused on instructional costs and they cannot at this time enable us to understand joint cost relationships in complex institutions.
- These procedures are designed to estimate total and average costs. They tell us nothing about marginal costs, or about opportunity costs to students, or about the costs to students of different educational alternatives.
- By themselves, total or average costs are of little value. The outcomes or benefits that accrue as a result of these costs must be taken into account when costs are compared. Moreover, knowing total and average costs is not so valuable as understanding the factors which caused these costs to be what they are.

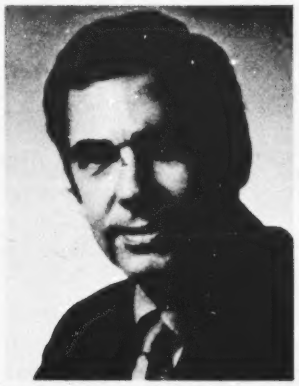
NCHEMS has been energetic in its efforts to make the limitations as well as the capabilities of its costing procedures widely known. Regrettably, there are those who still do not understand or who disagree with these NCHEMS guidelines, and so use the procedures as they see fit. This leaves NCHEMS with only two alternatives: to stop the abuse by abandoning the whole cost analysis effort, or to further refine and develop the procedures in an effort to overcome their limitations and minimize misuse.

COST ANALYSIS: *One Way or Another*

NCHEMS is convinced that the first alternative is impractical. Politically, the demand for this type of cost analysis is not going to disappear. If NCHEMS does not go on with this work, it seems likely that state governments or the federal government will continue it. In view of this probability, the NCHEMS Board of Directors, more than half of whose members represent institutions, feels that it is imperative for the Center to move forward in the most analysis field.

Demands come from several quarters for better cost analysis. The issue boils down to this: Will we in postsecondary education improve cost analysis ourselves, or will we surrender the task to government agencies and so invite them to delve further into the management of institutions?

THE AUTHOR



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A native of Bremerton, Washington, Dr. Lawrence is a graduate of Whitman College and the Western Baptist Seminary. An ordained minister, he engaged in mission work in West Africa for thirteen years, including service as Superintendent of the Cameroon Baptist Mission Schools from 1956 to 1959. He earned two graduate certificates for education studies at the University of London during leaves from his mission assignment and then an M.Ed and a Ph.D. in education at the University of Oregon.

Upon completion of his doctoral work in 1966, he became Executive Director of the Oregon Educational Coordinating Council. In 1969, he joined WICHE as Director of the Management Information Systems program, which two years later became NCHEMS.

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